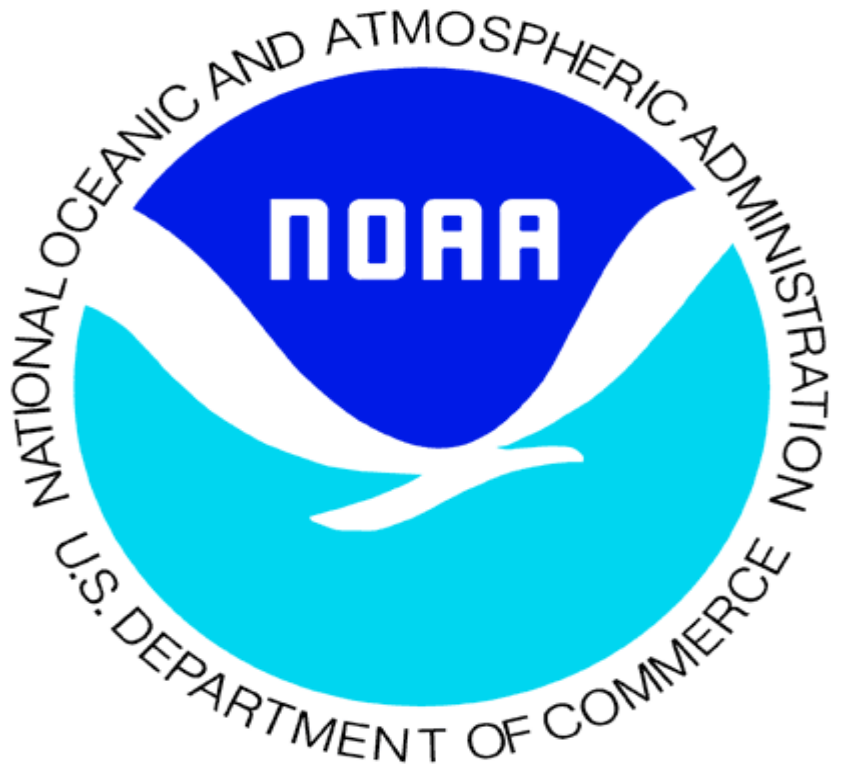
Iowa Tornado Climatology 1980-2004



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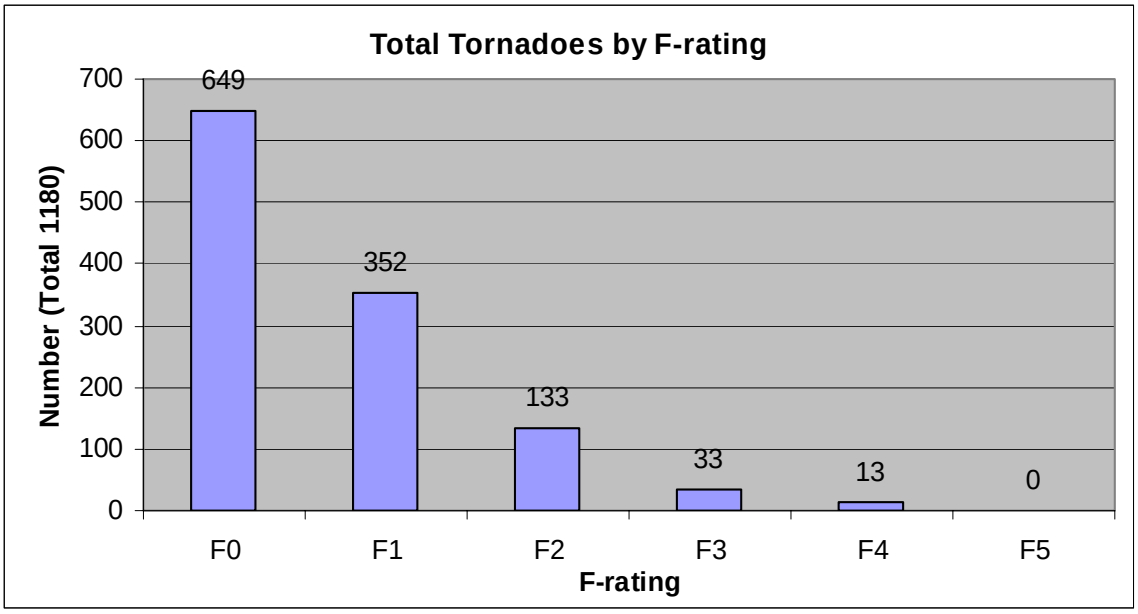
The following data contains tornado information for the state of Iowa from 1980 through 2004. The information provided was derived from National Weather Service Storm Data reports archived at the National Climatic Data Center. The cutoff of 1980 was chosen for two particular reasons: First, reporting of tornadic events was much more sporadic prior to this time with numbers skewed heavily toward higher end events. These events tended to cause more damage, therefore attracting the attention of local authorities if not the general media as well. As a result, there was also a better chance for the stronger tornadoes to be reported to the local National Weather Service office for inclusion into Storm Data. Weak tornadoes, on the other hand, may have been observed, but due to the lack of damage and/or poor communications, the report never made it beyond the local coffee shop. Secondly, tornadoes are rated on the F-scale (Fujita scale) via a damage assessment. Prior to 1980, much of the assessment was done via newspaper articles and pictures often several years and in some instances, decades after the event. Although much information can be gleaned from these articles and pictures, a good F-scale assessment should be done as quickly as possible after the event and if possible, at the location of the event. This is not an attempt to minimize events prior to 1980, since many significant events occurred prior to this time (e.g. Jordon Tornado, Charles City Tornado, etc…). However, from a climatological perspective, it was felt that the better assessment and reporting procedures of the last 25 years would be used to build the database.

Totals Data

The total number of tornadoes for the 25 year period in Iowa was 1180. The first of the subsequent two charts gives an F-scale breakdown of these tornadoes while the second chart provides the actual F-scale with associated wind speeds and approximate damage.

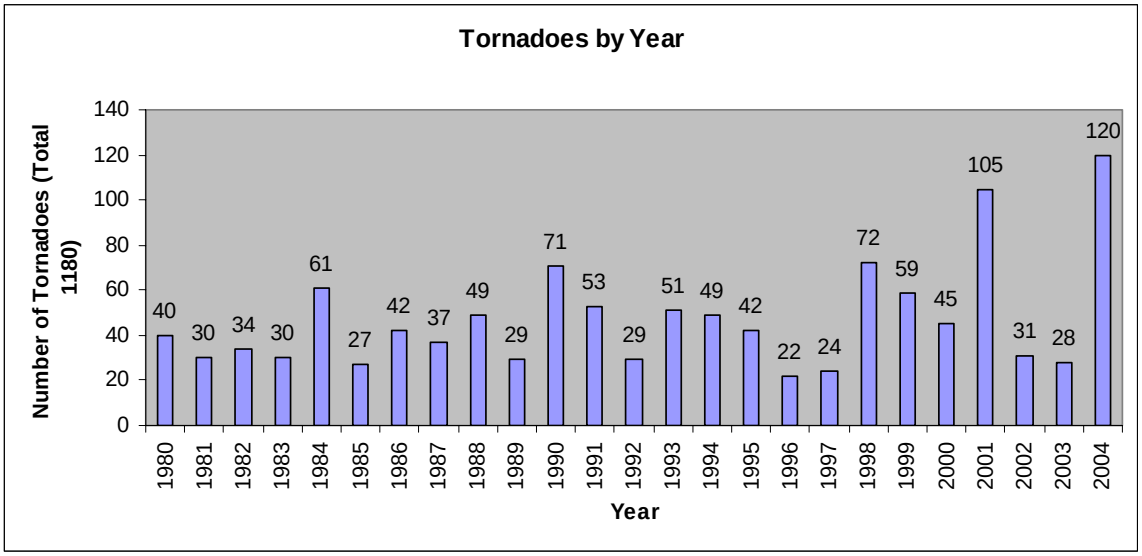


F-Scale Number	Intensity Phrase	Wind Speed	Type of Damage Done
F0	Gale tornado	40-72 mph	Some damage to chimneys; breaks branches off trees; pushes over shallow-rooted trees; damages sign boards.
F1	Moderate tornado	73-112 mph	The lower limit is the beginning of hurricane wind speed; peels surface off roofs; mobile homes pushed off foundations or overturned; moving autos pushed off the roads; attached garages may be destroyed.
F2	Significant tornado	113-157 mph	Considerable damage. Roofs torn off frame houses; mobile homes demolished; boxcars pushed over; large trees snapped or uprooted; light object missiles generated.
F3	Severe tornado	158-206 mph	Roof and some walls torn off well constructed houses; trains overturned; most trees in forest uprooted
F4	Devastating tornado	207-260 mph	Well-constructed houses leveled; structures with weak foundations blown off some distance; cars thrown and large missiles generated.
F5	Incredible tornado	261-318 mph	Strong frame houses lifted off foundations and carried considerable distances to disintegrate; automobile sized missiles fly through the air in excess of 100 meters; trees debarked; steel reinforced concrete structures badly damaged.

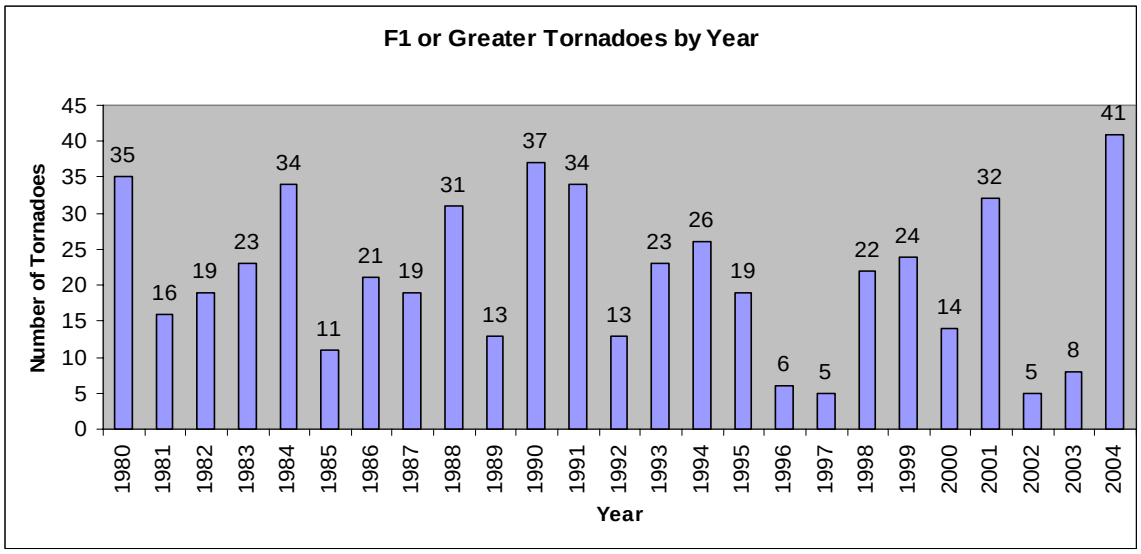
What is obvious from the first chart is that a very large majority (85%) of the tornadoes are on the low end of the scale (F0, F1). The remaining 15 percent of tornadoes were rated F2 through F4 with no F5's in Iowa since 1980. In fact, the last F5 to occur in Iowa was the Jordan tornado, which occurred in Boone and Story counties on June 13th, 1976.

Yearly Data

Next we will look at the number of tornadoes by year. Since 1980, there have been on average, 47 tornadoes per year in Iowa. However, the variation from year to year can be great which is evident in the last two years when 2003 had 28 tornadoes and 2004 had 120.

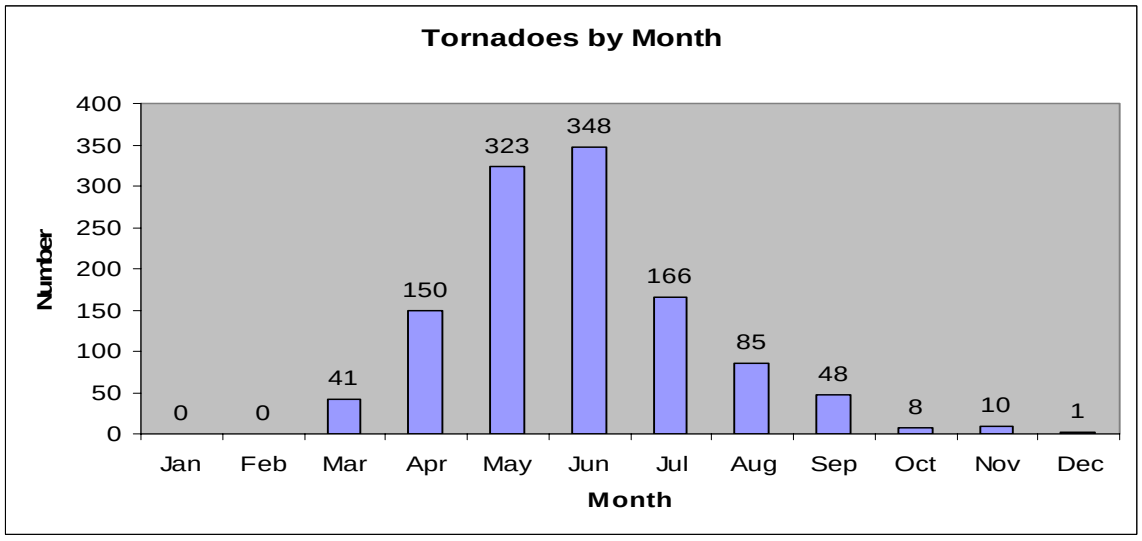


Of note on the above graph, Iowa has broken the yearly record for the number of tornadoes in 1998, 2001 and again in 2004. However, when taking out the F0's from the data and plotting the number of tornadoes (graph below), we see that the number of F1's to F5's have been relatively flat over the last 25 years. It becomes obvious that most of the increase in tornado numbers over the period have come from the better reporting of F0 tornadoes.



Monthly Data

Breaking the data down into monthly periods (graph below), we see that May and June are about equal in the number of tornadoes. These two months have prime conditions for tornadoes including warm temperatures, ample moisture, and relatively strong winds at different levels in the atmosphere. However, it should be noted that tornadoes do occur in every month of the year in Iowa. The data here only reflects tornadoes since 1980 with tornadoes having been reported in January and February prior to the study period.

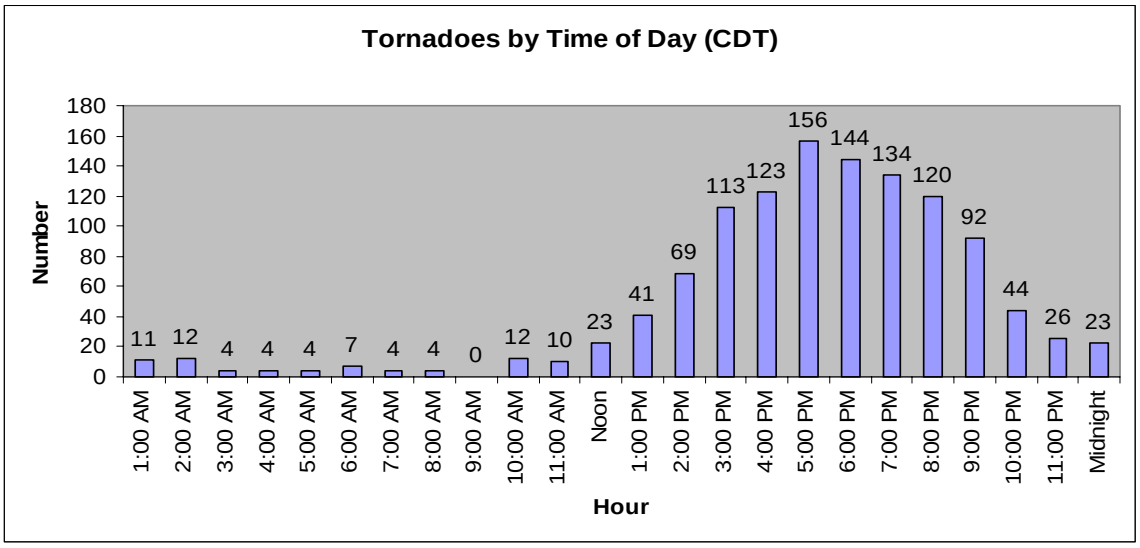


The rankings below provide the most tornadoes recorded in a one month period. May and June are heavily represented with a smattering of other months.

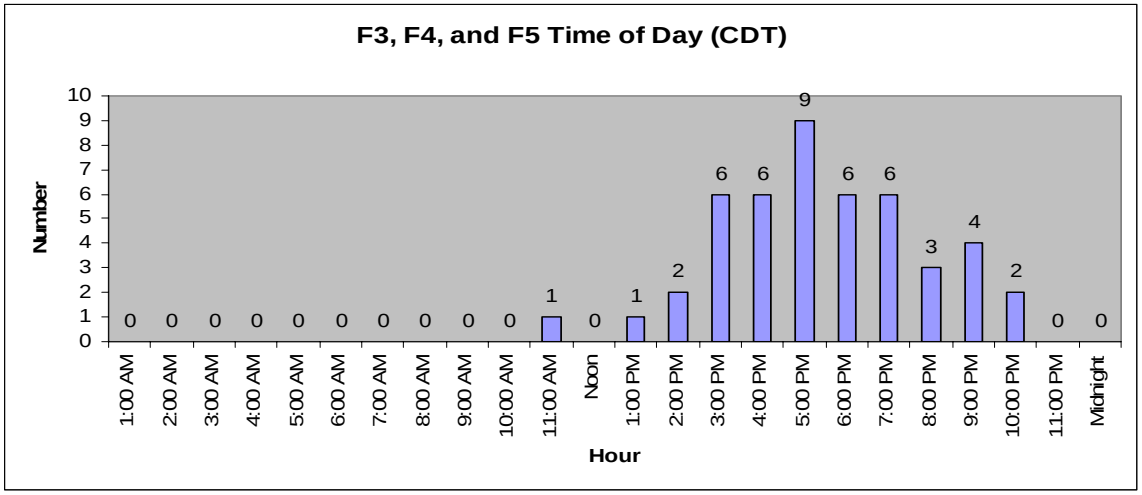
Rank	Date	Tornadoes	Rank	Date	Tornadoes
1.	May 2004	57	11.	May 2000	24
2.	June 1984	48	12.	May 1995	22
3.	April 2001	40	13.	June 1994	20
4.	June 1990	36	14.	July 1994	19
5.	May 1998	34		April 1999	19
	June 2001	34		June 1999	19
7.	June 2004	28	17.	July 1993	18
8.	June 1993	26	18.	May 1982	17
9.	May 1988	25		March 1990	17
	June 1998	25	20.	August 2004	16

Daily Data

As with certain months being more favorable than others for tornadoes, the same applies to the time of day. From the chart below, it is easy to see that from mid afternoon until around sunset, there is a peak in activity. Tornadoes need plenty of energy in the atmosphere to develop and maintain their structure. The sun warms up the atmosphere and the peak temperatures of the day often occur by mid afternoon. This warmth, combined with moisture in the atmosphere provides much of the energy needed to produce tornadoes (although other factors are also necessary). They are able to feed off this energy fairly efficiently until sunset when the surface temperatures begin to cool more quickly. The cooling decreases the energy in the lower atmosphere and therefore tornadoes have a more difficult time developing, especially for much of the AM hours. However, note that this is not always the case as tornadoes can occur at any time during the day or night given the right conditions.



Notice that the more intense tornadoes (below chart), occur primarily with the heat of the day. None have occurred in the 12 hour period from 11 PM to 10 AM CDT.



Another rankings list is provided giving the most tornadoes on an individual day. Again May and June have the most but some big events have also occurred in April.

Rank	Date	Tornadoes
1.	April 11, 2001	28
2.	June 11, 2004	24
3.	May 8, 1988	22
4.	June 7, 1984	21
5.	May 22, 2004	20
6.	June 1, 2001	18
7.	April 8, 1999	16
8.	May 21, 2004	16
9.	March 13, 1990	14
10.	May 15, 1998	13

Rank	Date	Tornadoes
	May 16, 1999	13
12.	March 22, 1991	12
	May 9, 1995	12
	May 10, 2001	12
	June 29, 1993	12
16.	June 16, 1990	11
	September 5, 2004	11
18.	May 23, 1981	10
	May 28, 1998	10
	July 27, 1995	10
	August 17, 2001	10
	August 26, 2004	10

Injuries and Deaths

Since 1980, there have been 547 injuries and 11 deaths attributable to tornadoes. The following is a breakdown of each by year. No trend is evident in the data.

Year	Injuries	Deaths
1980	8	0
1981	12	0
1982	1	0
1983	35	0
1984	100	3
1985	30	2
1986	8	1
1987	0	0
1988	92	0
1989	9	0
1990	16	0
1991	4	0
1992	3	0
1993	9	0
1994	1	0
1995	3	0
1996	2	0
1997	0	0
1998	133	0
1999	28	2
2000	26	1
2001	12	2
2002	0	0
2003	0	0
2004	15	0

Contact Information

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